Chapter 11
WATER SUPPLY

Water supply directly affects the combat efficiency, morale, general health, and welfare of soldiers in battle. It is required for consumption, decontamination, sanitation, and construction, as well as for vehicle operation and maintenance. The quantity required depends upon the regional climate and the type and scope of operations. The quality necessary depends on the intended use of the supply. Water requirements are significantly greater in rear areas, where there is heavy demand for aircraft and vehicle washing, medical treatment, laundry and bath facilities, and construction projects. Nuclear/biological/chemical (NBC) operations also use large amounts of water (see Chapter 14).

RESPONSIBILITIES

The Theater Army Commander is responsible for the control and distribution of water to US Army forces, to other US services, and, as required, to allied support elements. The Theater Army Deputy Chief of Staff for Logistics (TADCSLOG) has the overall responsibility for developing the water distribution plan for the theater and supervising the TA Commander's priorities and allocation procedures.

The senior ENCOM headquarters and its subordinate engineer organizations are responsible for the detection of subsurface water, well drilling, construction, and repair and maintenance (excluding organizational maintenance) of support facilities. Engineers are responsible for construction and maintenance of semipermanent and permanent water utilities at Army fixed installations. Management of water utilities at fixed installations is accomplished by facilities engineers.

Logistical and civil affairs personnel or HNS, if available, operate and perform organizational maintenance on semipermanent and permanent water purification utilities at fixed installations. The logistics organizations are responsible for the management, control, purification, storage, and distribution of water, including organizational maintenance of water equipment.

Military units deployed in a contingency area must initially secure water for themselves or carry sufficient water with them until engineers, quartermaster water units, and supply and services (S&S) elements can establish water operations. Divisional engineer units moving with the combat units can provide important information about surface water sources and existing wells in the area of operation. This information is useful for supplementing maps and other existing data. When operations are conducted in an arid environment, it is particularly important that all water sources are located and secured. Engineer terrain analysis teams and the water detection response team can provide valuable information about where to look for water sources.

If sufficient water sources are not available in the contingency area, water may be imported from third country supply bases (TCSB) or from CONUS. Engineers will provide construction support to assist in the unloading of water. Engineers can provide pier and wharf construction and potable water pipeline construction capability to the force in order to move water forward into the corps area.

In a fully developed contingency area, water should be distributed by hose line and pipeline. Engineer units will assist water supply units by providing pipeline construction and maintenance and repair beyond the water unit's organic capability.

PLANNING

In developed areas, existing water sources and distribution systems are used to provide field water supply. In undeveloped areas and forward of the COMMZ in developed theaters, water supply points are established as far forward as possible, given the locations of available water sources, consuming units, the tactical situation, and the commander's plans.

Initially existing developed and surface sources are used before ground water resources are tapped. The employment of NBC munitions can contaminate surface water

supplies over a wide area. Subsurface water supplies are unlikely to be contaminated at first. Earth and rock layers are effective in diminishing contamination. In an NBC emergency, it may be necessary to use a subsurface water supply.

WELL DRILLING

As a contingency, well drilling operations should be planned to meet an NBC threat. In general, wells will be established to provide water to forces in a new Theater of Operations, to forward units in a mature theater, and to forces that occupy permanent or semi-permanent fixed Army installations in a mature Theater of Operations. Wells are located and drilled in secure support areas of brigades or higher levels or organizations. The purpose of well drilling is to supplement existing water sources, reduce logistical distances, and to avoid the use of contaminated water supplies. In arid regions, wells may sustain the force after the initial lodgement phase of operations.

ENVIRONMENTAL EFFECTS ON PLANNING

Environmental conditions determine the location of water sources and how much water is needed for subsistence. The chart shows the characteristic advantages and disadvantages associated with supplying and using water in a variety of climatic conditions.

TEMPERATE REGIONS

Advantages	Disadvantages
Abundant resources Ž Lakes Ž Streams Ž Rivers Ž Existing wells Ž Local water Systems.	Surface sources easily contaminated by NBC munitions.
Sources convenient to locate, develop, and access.	Natural contamination possible by organics, disease-bearing organisms, and inorganic salt.
Water sources can be purified at small unit level.	Environmental pollution from local development such as septic fields, may contaminate ground water.
Drinking water does not require cooling.	

TROPICAL REGIONS

Advantages	Disadvantages
Water resources available but more scattered Ž Lakes Ž Streams Ž Rivers Ž Existing wells Ž Local water systems.	Surface sources easily contaminated by NBC munitions.
	Dense vegetation may make access difficult.
	Increase of natural contamination.
Water sources can be purified at small unit level.	Presence of waterborne diseases and parasites capable of transmitting disease may make water unsuitable for bathing and laundry use until disinfected.
	Higher water use needed because of high humidity and heat.

FRIGID CLIMATES

Advantages	Disadvantages
Water resources may be abundant, but frozen Ž Lakes Ž Rivers Ž Streams Ž Existing wells.	Increased consumption to prevent dehydration.
	Water purification, storage, and distribution system must be protected from freezing.
	Snow and ice are impractical to melt for other than very small units due to excessive fuel needed for melting.

ARID REGIONS

Advantages	Disadvantages
None.	Surface fresh water almost nonexistent.
	Available water sources limited and widely dispersed.
	Increased water use to prevent heat casualties.
	May dictate the tactical scenario.
	Lack of water makes extensive storage and distribution system vital.

ENGINEER CAPABILITIES

The versatility of the engineer battalions combined with the special capabilities of certain engineer companies and teams makes the engineer force an especially valuable asset to the TA Commander. The Engineer Combat Heavy Battalion is best suited for the general engineer support tasks associated with water distribution. The Combat Engineer Battalion may be assigned certain tasks; however, this unit's construction capabilities are limited.

Specialized engineer companies and teams augment the engineer battalions' capabilities for certain projects. The Engineer Port Construction Company may be employed for those tasks associated with waterfront construction and construction over the water. The Engineer Pipeline Construction Support Company augments the engineer battalion with specialized skills and technical advice for the construction, repair, and maintenance of water pipelines and rigid storage tanks. The Terrain Analysis Team can provide valuable assistance for determining the precise location for water wells. Water wells are drilled by engineer water well drilling teams.

ENGINEER BATTALIONS

Engineer battalions are employed in general support (GS) to the logistics units involved in purification, storage, and distribution of water. Expected tasks include the following:

- Develop water points by creating ponds and lakes across streams, deepening and reinforcing existing water collection areas.
- Provide drainage to prevent contamination of water sources from storm runoff.
- Construct physical protection structures for water sources.
- Construct and improve roads from water points and well sites to MSRs.
- Maintain, repair, and construct semi-permanent and permanent water utilities at Army fixed installations.
- Repair and construct water storage and distribution systems in arid environments.

These tasks are general and all engineer battalions are capable of carrying them out to some degree. The Combat Heavy Engineer Battalion has a greater capability for conducting these tasks than the Combat Engineer Battalion.

ENGINEER PORT CONSTRUCTION COMPANY

The specialized Engineer Port Construction Company can augment engineer battalions or work independently on small projects involving waterfront and construction over water. In support of water supply efforts, the company may—

- Construct, repair, or assist in the construction or repair of piers and wharfs where water tanker vessels may be unloaded.
- Install offshore mooring points and hose lines for water tankers.
- Install water pipelines in the port area.
- Construct water storage facilities in the port area.
- Assist water purification companies with the site preparation and installation of reverse osmosis water purification units (ROWPUs).

ENGINEER PIPELINE SUPPORT COMPANY

Engineer units have the mission of designing and installing tactical (surface laid) potable water pipeline. These pipelines extend as far forward as necessary in order to carry out the TA water distribution plan.

The standard pipe is either 6-inch or 8-inch aluminum, connected by mechanical couplings. The water is moved through the pipe by pumps, positioned along the line by the hydraulic design requirements. Standard accessories (valves, bends, manifolds) are available. These allow the pipeline to be adapted to any situation.

The material used for water distribution systems is the same material which may later be used for a POL distribution system.

WARNING. NEVER introduce potable water into any system which contains equipment that has previously been used to transport fuels.

The design and construction of the water pipeline is similar to that used for the POL distribution systems. More pumps are required, because water is heavier than petroleum fuels. Consideration must be given to the temperature variation in the area, because water freezes at a higher temperature than petroleum.

The Engineer Pipeline Support Company is used to augment engineer battalions engaged in the construction of surface laid, potable water pipelines. Pipeline Support Companies provide specialized equipment and technical advice to engineer battalions.

The Engineer Pipeline Construction Company is capable of—

- Constructing short pipelines.
- Providing personnel and technical expertise for pumping station construction.
- Providing specialized equipment for cutting, leveling, or grooving both steel and aluminum pipe for joining either by welding or bolted connections.
- Providing technical assistance or independently erecting steel tanks for water storage.
- Conducting route survey for pipelines.

ENGINEER TERRAIN ANALYSIS TEAMS

Engineer Terrain Analysis Teams are assigned to the topographic engineer battalion in support of the TA command. The ENCOM Terrain Analysis Teams may be attached to the corps or the division as required. Terrain Analysis Teams acquire terrain data from existing data bases or from physical reconnaissance. They use this information to prepare map overlays and reports needed to locate potential water sources.

WATER DETECTION RESPONSE TEAMS

In the event that insufficient data is available for the terrain analysis teams to locate potential water bearing areas, special surveys may be undertaken. A Water Detection Response Team (WDRT) maybe requested from the US Army Engineer Topographic Laboratory/ Terrain Analysis Center (USAETL/TAC) through the ENCOM. This team is composed of civilian scientists and is specially trained and equipped to locate water bearing areas. The team uses the latest, most sophisticated seismic and remote imagery techniques and equipment to locate water bearing foundations. Because the members have civilian status, this team may only be used in secured areas.

WATER WELL DRILLING TEAMS

Water well drilling is accomplished by well-drilling teams that are organic or attached to nondivisional engineer units. These teams have sufficient personnel to achieve 24-hour drilling capability. Drilling rigs are either truck or semitrailer mounted, and have limited cross country mobility. Therefore, external support may be required in order for the team to reach the drilling site. Semitrailer mounted drilling rigs are capable of reaching depths of 1,500 feet. Truck mounted rigs can reach depths of 600 feet. The teams and their organic equipment maybe shipped, airlifted, or driven over land.

In general, each well drilling team can complete two wells in approximately three and one half days. Two wells can support one quartermaster water supply point. Material sufficient to complete two wells per team is the unit's standard load. The teams are not logistically self-sufficient. They are incapable of providing their own security. The teams are dependent on supporting units to clear a drilling site and excavate mud pits. A water source must be provided to allow drilling to begin.

The following are other general considerations concerning completed water wells:

- Water wells can easily be contaminated by local open wells and septic fields.
- Water well production can affect levels of local wells due to the drawdown of the water table.
- Water table levels often fluctuate with the seasons.
- Aquifers of limited geographic extent with small recharge areas can quickly be depleted.
- Abandoned uncapped wells will become contaminated and degrade the existing ground water supply.
- Well drilling in active volcanic areas or geothermal areas can be hazardous.
- Well drilling near oceans can cause salt water intrusion and contaminate fresh water sources.

Once a well is completed by installing casings, screens, and pumps, it is turned over to quartermaster water units for use. To prevent contamination, wells must be capped when they are no longer needed. In order to expedite reopening of closed wells, agreements have

been made between many host nations to standardize capping and labeling. These procedures are covered for the North Atlantic Treaty Organization (NATO) by Standardization Agreement (STANAG) 2885.